# Light and Lighting

Official Journal of the Illuminating Engineering Society

Incorporating "The Illuminating Engineer."

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## Victory Lighting Again

WE return to the theme of Victory Lighting, which formed the subject of editorial notice in our June issue.

We do so in view of the informative illustrated review of the arrangements contributed by Mr. R. W. Ames (see pp. 117-130). This has been specially prepared as a record of the excellent work done by the Ministry of Works in this field, and marks an important precedent.

For it illustrates what was emphasised in our last issue, that the floodlighting of historic buildings on occasions of great national rejoicing is no longer being left to private enterprise, but is now rightly regarded as a national obligation.

No doubt there will be further opportunities in the future—and in the case of some historic buildings floodlighting may become the usual practice, not only a treat on rare occasions.

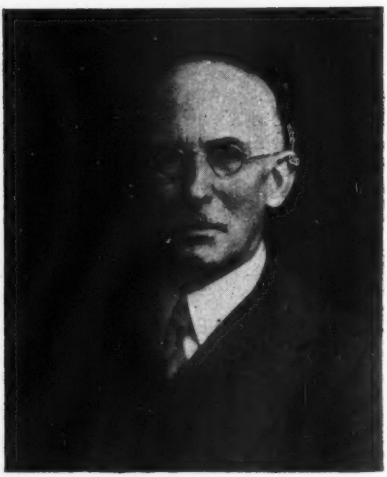
## *The Length of Papers*

Our note on the I.E.S. papers in the last issue has led to inquiries in regard to *length* of contributions. This is indicated in the "Recommendations to Authors" already quoted,* which prescribed 5,000 to 6,000 words—"to be extended only when subjects demand specially detailed treatment." Written contributions may be and often are of much smaller length. Conciseness is a great advantage in these times, not only owing to the expense of printing and the restrictions imposed on paper supply, but also because material that is concise is so much more likely to be studied. Unfortunately there seems to be a tendency on the part of authors to assume that the special nature of their materials demands treatment at length, with the result that papers containing 10,000 (or even 15,000 to 20,000) words are not uncommon. This is in fact a sin to which writers on technical subjects are specially prone. Some of them seem to write almost without consideration for present limitations; they do not ask themselves whether elaborate tables (exceptionally expensive to print) and complex mathematical formulae are really essential in order to bring home the point they have in mind. They would do well to remember that brevity is not only the soul of wit, but the surest means of gaining attention for their efforts.

*Trans. Illum. Eng. Soc. (Lond.), Sept., 1945, p. 194.

## *Sir Clifford Paterson*

A pleasing item in the Birthday Honours List was the bestowal of a knighthood on Dr. Clifford Paterson, whose portrait appears below. Sir Clifford has directed the G.E.C. Research Laboratories at Wembley since their initiation in 1919. He is an O.B.E., and a Fellow of the Royal Society, and has won many other distinctions. To I.E.S. members he is familiar as a highly esteemed Past President, who is also one of the small band of "original members" of the Society.



## *Resettlement Courses in Illuminating Engineering*

The introductory course in illuminating engineering to which we drew attention recently* is now approaching its termination. It will probably be followed by a somewhat longer course (9-10 months) commencing in September next and likewise preparing entrants for the examination of the City and Guilds of London Institute in illuminating engineering. Those interested in this course should get in touch with Mr. C. E. Greenslade at the Borough Polytechnic, London, S.E.1.

The initial resettlement course seems to have had promising results, probably better than could be expected from night courses spread over a longer period. We understand that there are about twenty students who have completed the course satisfactorily, and, having thus acquired a fair theoretical knowledge, now wish to get situations where they can get practical training in the lighting industry.

We make this known in the hope that some of the I.E.S. sustaining members will be able to find opportunities for such students. It is, of course, difficult to assess services and remuneration. We imagine, however, that in general salaries of the order of £250 to £400 per annum would be reasonable for a start.

The support of leading firms in the lighting industry in this manner is evidently essential to the full success of educational schemes. Enquiries by them, if addressed to I.E.S. headquarters, will result in contact being made with those desiring engagements. If it is generally realised that courses of instruction offer a definite avenue to employment there should be little difficulty in securing entrants in future.

*LIGHT AND LIGHTING, April, 1946, p. 58.

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## *State Licensing of Professional Engineers*

The American I.E.S. is keenly interested in this question, and a detailed report has been issued by a Committee in which the practice of the various States is reviewed. The American I.E.S. apparently is associating itself with this inquiry with a view to securing that illuminating engineers get the privileges and recognition sought for professional engineers in general. This is something wider than the object of defining the qualifications of an illuminating engineer as such—which is nearer to the problem that the I.E.S. in Great Britain is considering. The position in America is complicated by the fact that individual States differ in the exact nature of their laws, and in some States there are no such laws. It will be interesting to observe the upshot of this investigation. In the meantime there is one point that one cannot fail to note—the assumption that the man concerned with lighting is primarily *an engineer* (as, indeed, the titles of the Illuminating Engineering Societies imply). Yet it seems by no means clear that skill in lighting, which involves an appraisal of the *effects* of the illumination provided, is a purely engineering business. There are many who handle lighting —architects and decorative craftsmen of various kinds—who might not subscribe to this idea.

## *Factory Lighting in New South Wales*

From some literature furnished by the Department of Labour and Industry in New South Wales it is interesting to observe that the requirements in regard to industrial lighting follow very closely those prescribed in the Factories Act of Great Britain (e.g., in prescribing a minimum of 6 ft.c., and in other respects). The requirements, however, apply to *all* factories (whether shift work or overtime is worked or not). Of special interest are the explanatory notes for the guidance of inspectors. The purpose of the Regulations is made clear, and the requirements to be fulfilled by the Regulations are explained. In particular hints are given in regard to the determination of sufficiency and suitability of the lighting. In this connection questions intended to determine whether the lighting is satisfactory and published by the Ministry of Labour and National Service in Great Britain are quoted. It is remarked that the ceiling and walls should be viewed as part of the lighting system, in view of their service in diffusing natural and artificial light. It is emphasised, however, that details of design and questions of efficiency and economy fall within the province of the occupier and his lighting expert, and are not matters on which an inspector can be expected to give a decision.

## *E.I.B.A.: Homes for the Aged*

Everyone knows of the good work of the Electrical Industries Benevolent Association. Its grants to beneficiaries have gone up by 50 per cent. during the last six years and are nearly five times what they were twelve years ago.

The Association is now planning a new development—the establishment of homes for the aged. Those interested should get in touch with the secretary of the Association at 32, Old Burlington-street, London, W.1, from whom a copy of the annual report may be obtained.

## *Mr. L. T. Minchin*

Mr. L. T. Minchin, a Fellow of the Illuminating Engineering Society, has recently resigned from the Watson House staff of the Gas Light and Coke Co., with whom he has been associated since Watson House was started in 1927. He is now practising as a consultant, dealing in particular with gas appliance design and also illumination. Mr. Minchin was concerned with the organisation of the first photometric laboratory at Watson House. He also, we are informed, made the first sinusoidal diagrams of gas street lamps, and published a paper in 1934 on "The Principles of Gas Lamp Design," containing a considerable amount of original research. More recently, in 1940, his paper given to the Illuminating Engineering Society will be remembered for its striking demonstrations, including the novel experiment of luminescence excited by flame gases. A co-opted member of the B.S.I. Street Lighting Committee, Mr. Minchin had a considerable share in drafting the recent draft specification. He anticipates that his work will in future consist mostly of planning of lighting installations, technical advice to lamp manufacturers, and, apart from lighting, advice on gas appliance design. Any inquiries should be addressed c/o *Light and Lighting*.

## *Retirement of Captain Hoare, R.N.*

Captain Robert Hoare, an I.E.S. member who is responsible for a number of inventions in the lighting field, is retiring after 20 years as secretary of the United Sea Service Club in Pall Mall. His career is a long one. We note that he sang in the choir on Plymouth Hoe nearly 60 years ago, when the Drake Memorial was unveiled (the 300th anniversary of the Armada). As a young naval officer he took part in the Victoria Jubilee Review at Spithead.

# Public Lighting for the Victory Celebrations in London as Designed and Executed by the Ministry of Works

(Reviewed by Rollason W. Ames)

The effect of special lighting in public places during occasions of national rejoicing is well appreciated. For this reason the recent lighting display in London, after many years of darkness, might be considered in the nature of a pre-view as to the trend of things to come in a brave new world.

Although at present a luxury, it may not be long before public lighting once more becomes a commonplace; and since the illumination engineer must be ready to use his specialised knowledge, the celebrations provide an opportunity for earnest discussions affecting both technical and aesthetic applications.

Whether one agrees with the decorative arrangements in general matters little at this juncture; but in the broad view, the ideas effected would serve to show that the application of light in a variety of form and colour can be made to emphasize the beauty and dignity of architecture and decoration. In providing a basis for discussion it may be expedient, therefore, to classify the various applications of light to modern and classical forms of architectural design.

For our purpose, which is to survey briefly the Victory lighting in London, it is proposed to consider the question in relation to the following fields of public interest:

1. Public buildings.
2. Parks, gardens, and open spaces, etc.
3. Flags, bunting, and decoration.
4. Sky display.
5. River display.

In passing, it is well to bear in mind the present restrictions affecting labour and materials. Normally the Ministry of Works would have employed their existing stocks and purchased new equipment where it became necessary. Unfortunately, enemy action had accounted for much valuable property, and its replacement in many cases was very difficult. It was more difficult to purchase new materials in order to carry out the ambitious schemes in mind.

These difficulties led to a policy in keeping with present day austerity, and the Ministry adopted a scheme under which all that could not be borrowed from Service departments should be manufactured from scrap materials existing in war-time stores. In this way most of the difficulties were gradually overcome, and the schemes went into effect. The various tables showing methods and details indicate briefly the source of supply of the equipment in general.

During times of ceremonial, and on gala days, a large number of buildings and places suggest themselves as being suitable for special treatment, and as the official programme shows, the most famous architectural treasures were once again made the subject of flood lighting and special

display work. For those unfamiliar with London and its environs the full list is repeated in table No. 1.

**Table No. 1—Full list of Buildings and Places at which Special Lighting was arranged**

Buckingham Palace
St. James's Palace
The Mall
Admiralty Arch
Trafalgar Square
Canada House
National Gallery
South Africa House
Nelson's Column and Statue
Fountains
Whitehall
Min. Agriculture & Fisheries
War Office
War Office Towers
R. United Service Institution
Gwydyr House
Richmond Terrace
Admiralty Recruiting Office
Post Office
Parliament Square House
Home Office
Whitehall (*Contd.*)
Treasury
Scottish Office
Horse Guards
Pay-master-General
Admiralty Old Block
Kirkland House
Houses of Parliament
Henry VII Chapel
Westminster Abbey
St. James's Park
Lambeth Palace
Somerset House
Royal Mint
Tower of London
St. Paul's Cathedral
Bethnal Green Museum
Royal Naval College
Hampton Court Palace
Windsor Castle

In addition, special river activity initiated the aquatic and firework display, which entertainment completed the programme for Victory Day. Both this display and that arranged in St. James's Park represent a new departure so far as this country is concerned, and they will, therefore, be discussed in some detail.

To simplify the discussion many of the technical details have been charted in tables Nos. 3 to 6, which also indicate the general features of each case.

Before regarding the schemes in detail it may be desirable to classify the types of lamps used, and to show how the various characteristics have been employed to achieve the desired results.

Although at present restricted to two colours, the gas discharge lamp, being monochromatic in nature, has solved many problems. For lofty and narrow façades, however, the designer must resort to incandescent lamps in order to obtain the necessary beam intensities. Again, new problems are invited when colours are considered, for plastic filters exhibit diverse propensities where high power projector work and aquatic application are concerned. On the other hand, glass filters are unobtainable at the present time, and to produce the schemes as envisaged some compromise must be sought.

**Table 2—Lamps used for the Various Displays**

*General Service Lamps* (For General Floods)
100 watts
200 ,,
300 ,,
500 ,,
1,000 ,,
1,500 ,,

*Projector Lamps* (For Narrow Limits)
250 watts
500 ,,
1,000 ,,

*Line Filament*
3,000 watts

*Low Voltage Lamps*
48 watts 12 volts (for Jets)

*Mercury Discharge*
400 watts for Floods

*Sodium Discharge*
140 watts for Floods

*Carbon Arcs*
for Miniature Searchlights to illuminate Cross of St. Paul's Cathedral

60 watts Line Filament Tubular Lamps for behind narrow ledges in decorative schemes.

Table No. 2 provides details of lamps together with notes on their application. The various schemes in which the lamps appear will now be discussed in relation to the classification already laid down, and which provides certain terms of reference.

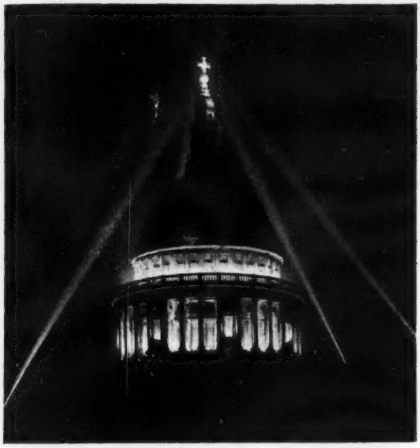
## Public Buildings

Generally, the aim appeared to have been that of "spot-lighting" the buildings concerned, that they at once became the principals amongst an otherwise sombre chorus. The most notable examples of this kind are those buildings which, on account of

their topographical position, preserve their distinction in an otherwise nondescript area.

Examples of this kind may be said to include the following:—

St. Paul's Cathedral.
Royal Naval College.
Mansion House.
Somerset House.
Tower of London.



*Ministry of Works photograph. Crown copyright reserved.*

**Fig. 1. St. Paul's Cathedral: Lighting of Cross and Rotunda.**

At the same time, the fact that these buildings may be considered as isolated rendered unnecessary any treatment in colour, although in some cases it was employed to heighten the effect. Normally, the buildings were delineated sufficiently by means of either unfiltered incandescent lamps or pure gas discharge lamps; the effects being purely monochromatic against the enveloping darkness.

Other buildings within the official list offered greater difficulty, for their topographical association with others of equal prominence rendered impossible any system of "spot-lighting." The group then must be treated as a whole, and with emphasis placed only upon unusual features. For example, the motif in Whitehall centred on the decorative arrangements, and the lighting was therefore made to implement this scheme. As such it will be discussed under another section.

Most of the other buildings in question must receive separate mention on account of their specialised treatment. At the same time particular reference should be made to the tables in question.

BUCKINGHAM PALACE.—In its almost pastoral setting Buckingham Palace must be considered as the crowning piece, especially on such an occasion as this. Moreover, its approach made it necessary that the full effect of the lighting should be appreciated from a considerable distance and should be the *raison d'être* of all the lighting and decoration along the Mall. It was therefore decided that the whole of the façade should be flashed in red, white, and blue. This included the South Colonnade, but care was to be taken that the colonnade on the opposite side should remain in darkness since it had suffered considerable damage.

Spot-lighting was also to be included, and directed towards both the Royal Standard and the historic balcony.

Finally, to complete the victorious setting, the V motif was to be regarded as essential, and in order that it should command the entire vicinity it should appear as though supported by the Palace. Searchlights, mounted in the grounds, were to be used for this purpose, and they were to be fitted with "Venrecoid" Blue filters. At the same time, to preserve a sense of balance, the main archway was to be treated in the same colour.

HAMPTON COURT PALACE.—In the magnificence of its truly rural setting, this lovely example of "historical" architecture provides unlimited opportunities for the application of decorative light. On floodlighting the extensive façades, consideration must be given to the reproduction of the

*Ministry of Works photograph. Crown copyright reserved.*

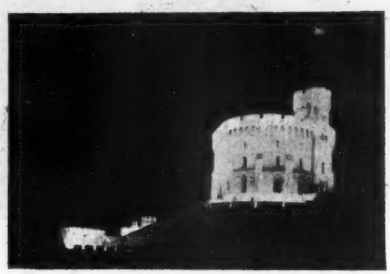
Fig. 2. Hampton Court Palace, seen from the river.

delightful tones that are to be found within the old brickwork, and it became essential to maintain the natural colour of the building. Apart from that of the building, prominence was also to be given to the famous view of Long Water in order to provide an entirely new aspect, and to the famous sunken gardens and fountains, where the beauty and colour of the flowers was to receive primary attention.

WINDSOR CASTLE.—This Royal residence commands the view for many miles around, and if the lighting schemes were to be successful, then the salient features must retain their prominence after nightfall. It was therefore decided to apply generous floodlighting to the castle precincts, whilst intensifying the effect for both the Round Tower and St. George's Chapel. The latter was to receive special treatment, for the intention was to render the building in gold by using mixed yellow and deep amber filters. The beautiful stained glass was also to be featured by flashing the surfaces from within.

*Ministry of Works photograph. Crown copyright reserved.*

Fig. 3. Long Water at Hampton Court.

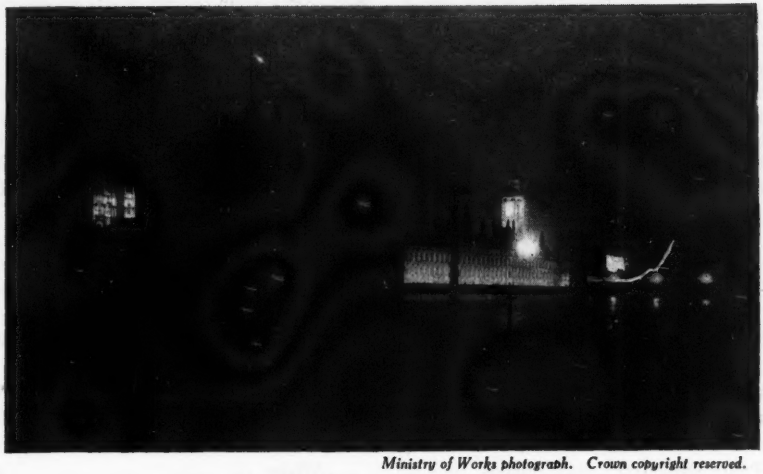


*Ministry of Works photograph. Crown copyright reserved.*

Fig. 4. Windsor Castle with the flag specially spot-lighted.

To complete the picture, the Royal Standard was again to become the subject of spot-lighting.

HOUSES OF PARLIAMENT.—Treated as the most important aspect of the water front at Westminster, the Ter-



*Ministry of Works photograph. Crown copyright reserved.*

**Fig. 5. Riverside view of Houses of Parliament.**

race façade (that alongside the river) required to be evenly flashed by means of high intensity floods. For the remaining precincts it only remains to draw attention to the floodlighting in New Palace Yard, and that specially arranged for the Clock Tower (Big Ben). By means of batteries of narrow angle floods the tower was to assume the leading position among the principal emblematical buildings of Westminster.

Finally, a triumphant Union Jack (or Royal Standard during the presence of H.M. the King) was to "float" in the sky above Victoria Tower; and which, to be from every direction observable, was to be the subject of special spot-lighting. The apparatus for such a display was to be mounted at the top of the tower, which was itself to remain in darkness. (See fig. 5.)

OTHER BUILDINGS.—Further specialised applications cannot receive the space they here deserve. Reference should, therefore, be made to the tables, whilst, in particular, the following buildings may be mentioned:—

Admiralty Arch
National Gallery
St. Paul's Cathedral
Westminster Abbey

**Parks, Gardens, and Open Spaces, etc.**

Within this section must appear those places of congregation which contained outstanding lighting possibilities by reason of their historic and/or aesthetic associations. Examples of this kind are found to be so varied that it may be wiser to mention their individual treatments.

ST. JAMES'S PARK.—It is impossible within the few words available to provide even a brief description of the scheme as envisaged and subsequently designed. To indicate the nature and extent of the arrangements that were finally developed would require many pages, for the Ministry of Works embarked upon an ambitious scheme of aquatic and lighting decorations of such proportions and magnitude as never before witnessed in this country. Moreover, within a matter of months from the day on which the original plans were made the final details must be ready for the first trials to take place.

The display as finally witnessed by

the public may be considered as a Ministry production throughout. For everything, apart from the transformer pattern and the wire-wound dimmers, was designed and made within the maintenance department. Indeed, it becomes interesting to note the ingenuity displayed in the matter of adapting scrap material and equipment left over from such organisations as A.R.P. and other defence services.

Generally speaking, the scheme as a whole may be described as follows (see table No. 4):—

The lake was to be the scene of operations, and it was decided to illuminate the bridge and to provide side

**Table No. 3—Public Buildings—Lighting Details**

| *Building* | *Lantern* | *Colours* | *No. Fittings* |
|---|---|---|---|
| Buckingham Palace ... | Floods (general) ... | Red and Blue ... ... | 101 |
| | Spots (balcony) | White | |
| Hampton Court Palace ... | Floods (general) ... | Red and White ... ... | 193 |
| | Special Features | | |
| Windsor Castle ... ... | Floods ... ... | White ... ... ... | 172 |
| Houses of Parliament ... | Floods ... ... | White ... ... ... ... | 197 |
| | Spots | | |
| St. Paul's Cathedral ... | Floods ... ... | White ... ... ... ... | 48 |
| | Min. Searchlights | | |
| Royal Naval College ... | Floods ... ... | White ... ... ... ... | 149 |
| Somerset House ... ... | Floods ... ... | White and Amber ... ... | 106 |
| Tower of London ... | Floods ... ... | White ... ... ... ... | 340 |
| St. James's Palace ... | Floods ... ... | Red, White and Amber ... | 27 |
| Admiralty Arch ... ... | Floods ... ... | White, Mercury ... ... | 76 |
| | | R. & B. under arch | |
| Horse Guards ... ... | Floods ... ... | White ... ... ... ... | 107 |
| | Spot | | |
| Westminster Abbey ... | Floods ... ... | White ... ... ... ... | 42 |
| Royal Mint ... ... | Floods ... ... | White and Amber ... ... | 22 |
| Lambeth Palace ... ... | Floods ... ... | Red and White ... ... | 50 |

*Ministry of Works photograph. Crown copyright reserved.*

**Fig. 6. Royal Naval College, Greenwich, seen from the river.**

jets of water, which also required special lighting. Duck Island and the Cottage were also to be the subjects of special treatment, and for the latter a complete waterwheel and waterfall required to be erected. (The wheel itself was made from an old cable drum which was mounted upon the bearings taken from a disused diesel set.) Pelican Rock and other well-known items of interest were also to be brought into relief.

The main effect, however, was to be the island fountains of various designs and colours. Some were designed as "ring" islands of rock plants, from the centres of which should emerge multi-coloured jets. Others were required as islands of coloured water whose pattern and form were to be varied by virtue of the types of jets employed.

Three colour changes were to be incorporated throughout, and by employing different combinations of primary and secondary colours on each fountain, it was considered possible to achieve a changing colour spray effect from one end of the lake to the other. Fig. No. 7 shows diagrammatically the nature of the typical colour change actually used.

To provide the utmost colour in the general scheme it was arranged that all the light should be projected more or less vertically from specially constructed watertight floating fittings. The filters in every case must not be affected by the action of water, and since glass was unavailable for this purpose it became necessary to substitute "Venrecoid," a substance similar to gelatine but one that was applicable to aquatic displays. Fig. No. 8 provides details as to the layout of fittings and jets for a typical island fountain.

The bridge also invited similar

**Table No. 4—Details of Display in St. James's Park**

*Aquatic Section*

11 Fountains (including 5 Island Rings and 6 Metal Rings with Sprays)

2 Waterfalls

1 Waterwheel

2 Cascade Effects

25 Pumps (ex A.R.P.) each 500 gall. per min.

4 Gondolas

*Lighting Section*

24 500-w lamps in floating fittings for every fountain

3 colour changes per fountain

8 Gen. Set, each 28 kVA at .8 pf

3 points of town supply (400/230 volts) 12 kW (with sliding coil secondary) Transformers and Dimmers

4 Gondolas

*Colour Changes*

| | |
|---|---|
| Bridges | 3 colours |
| Waterfall, Waterwheel | 4 colours |
| Fountains | 3 colours |
| Others | 2 colours |

*Sequence of Colour Change* for Fountain shown in Fig. 7

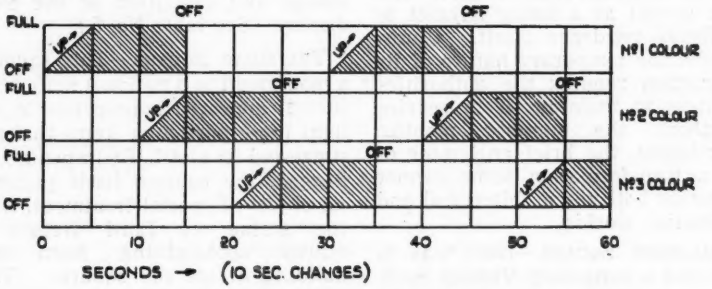



Fig. 7. Colour change sequence for fountains.

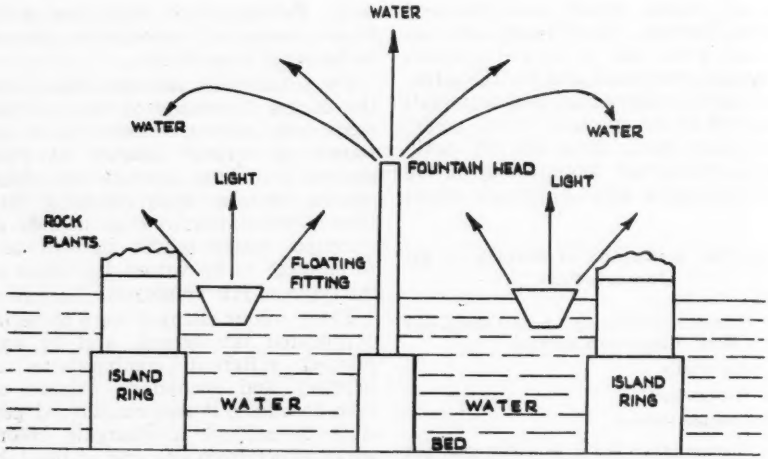



Fig. 8. Section through typical ring island.

problems; and in addition the safety and convenience of the public must be regarded in all the arrangements proposed for their entertainment. It was therefore agreed that jets of water should emerge from each side of the bridge, and that a three-colour change should again be included in order to produce an effect of three colours (red, white, and blue) constantly following one another across the bridge.

To conclude the subject of St. James's Park it may be remarked that the result of all these extensive arrangements was to transform this part of London into a veritable fairyland of unimaginable delight and which served as a fitting adjunct to the Royal residence itself. Unfortunately, the temporary nature of its construction renders the authorities powerless to maintain it in service throughout the summer months. Nevertheless, the brief encounter of such a transformation scene cannot but inspire both the architectural and illumination worlds.

PARLIAMENT SQUARE.—Here was to be erected a temporary Victory Arch, which should also contain the Flaming Sword of Justice within its motif. The arrangements made for the surrounding buildings already promised an abundance of light within the locality, and it was, therefore, arranged only to illuminate the sword and the flames engulfing it. This could only be carried out by means of projector floods, mounted vertically within a specially constructed box erected underneath. The blade itself was to be thrown into relief by virtue of the line filament tubular lighting that was to be mounted vertically behind.

Here again the Ministry of Works was entirely responsible for both the design and execution of the entire display. (See table No. 5.)

TRAFALGAR SQUARE.—This square is a monument to a national hero, and as such it appeared appropriate to spotlight those particular items that most suggested its motif. Bedraped and beflagged, the column itself presented an object of special treatment, whilst the statue of Lord Nelson required spot-lighting from some building across the square. Three miniature searchlights were con-

sidered necessary for this one item. (See table No. 5.)

REGENT'S PARK.—The Open Air Theatre is once more a popular feature of this park, for since the end of the war it has been possible to reinstate the normal methods of lighting, and these fell into the natural order of things for Victory Day.

### Flags, Bunting, and Decoration

If the buildings and associated surfaces were to be treated with light, then it followed that all forms of temporary decoration must also be included. For to neglect what might be termed the "insignia of the day" might destroy much of the general effect. Fortunately, the majority of the decorations either came within the range of existing street lighting or they formed part of an area that was to be flashed.

On the other hand, the illumination of the flags in Whitehall was to be considered more important than that of the buildings, and it was decided to pay more attention to the decorations than to their associated surfaces. By means of Admiralty spot lanterns each flag, or group of flags, was therefore to be made the subject of special interest, whilst the spilled light would delineate the adjacent architecture sufficiently.

Other examples were to be found in Trafalgar-square, the Mall, and Admiralty Arch.

### Sky Displays

In spite of its ominous implications the searchlight remains a popular adjunct during affairs of this nature. Moreover, it was perhaps most fitting that at least one implement of war should be employed to demonstrate the arts of peace. It was also appropriate that the searchlights should be operated by the Royal Artillery (Anti-Aircraft Command), which was now to show its skill in a happier way by suggesting patterns of royal colours.

It was clearly impossible to employ specially constructed glass filters for this purpose; but by a skilful use of extra thick "Venrecoid" or "Cinemoid" the sky display, which was to become a great part of the river display, became a practicable proposition. Details of the filters as used are given in fig. No. 9, and it may be interesting to note that, in spite of the great heat, the results were highly commendable, and the filters were found to be serviceable for many

**Table No. 5—Public Buildings and Open Spaces—Lighting Details**

| *Building* | *Lantern* | *Colours* | *No. Fittings* |
|---|---|---|---|
| TRAFALGAR SQUARE SCHEME :— | | | |
| Canada House ... ... | Floods ... ... | White ... ... ... | 49 |
| National Gallery ... ... | Floods ... ... | White, Red and Gold ... | 45 |
| South Africa House ... | Floods ... ... | White ... ... ... | |
| Nelson's Column ... ... | Special Feature ... | ... ... ... ... | 16 |
| Nelson's Statue ... ... | Min. Searchlights ... | White ... ... ... | 4 |
| Fountains ... ... ... | Under Water ... | Red, White, Blue and Amber changing ... | 72 |
| PARLIAMENT SQUARE :— | | | |
| Houses of Parliament ... | Floods ... ... | White ... ... ... | 197 |
| Henry VII Chapel ... | Floods ... ... | Flame and White ... | 67 |
| Westminster Abbey ... | Floods ... ... | White ... ... ... | 42 |
| Decorative Arch ... ... | Floods ... ... | White ... ... ... | 6 |
| | Line Filament Tubular Lamps | White (behind sword) ... | 20 |

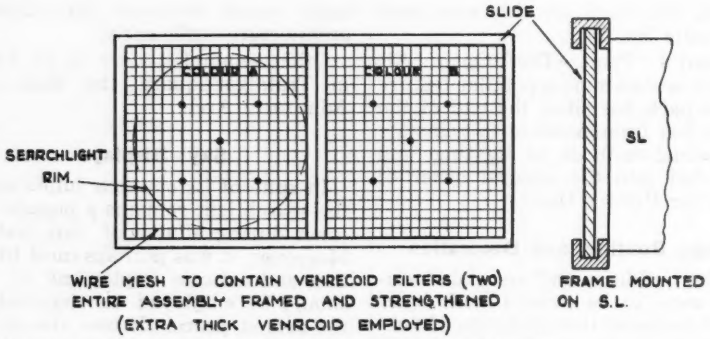



Fig. 9. Searchlight filters for colour changing.

more displays so long as they remained undisturbed within their frames.

### River Display

The effects of coloured light of any form were exploited beyond the realms of the public imagination when this unique display entered upon the design stage. Regarded as the "high light" of the day's programme, the object was to suggest sheer beauty of form, brilliance, and movement; and any means by which this motif might be presented were to be included.

Light, water, fire, and music: these excited the imaginations of the designers, and schemes to embrace all four were developed until the possibilities were found to be enormous.

The display, as it finally emerged, may be considered in the nature of three separate demonstrations which, in relation to the three mentioned elements, were to be carefully interwoven with appropriate and traditional music to produce one great canvas of such splendour and dimensions that only planning on a national basis could produce.

Though necessarily brief, the following description will serve to illustrate the salient features of the display, and which, for convenience, have been related to the three aspects of the general decor. Table No. 6 and Fig. 11 provide full details of the apparatus involved and the sequence of events which shows the general pattern of the display.

Water Display.—Here the general motif was to be found within the decoration of the river itself, which was to disgorge scores of coloured jets. These jets were to be effected in various designs to present the appearance of fleurs-de-lys. At the same time, it

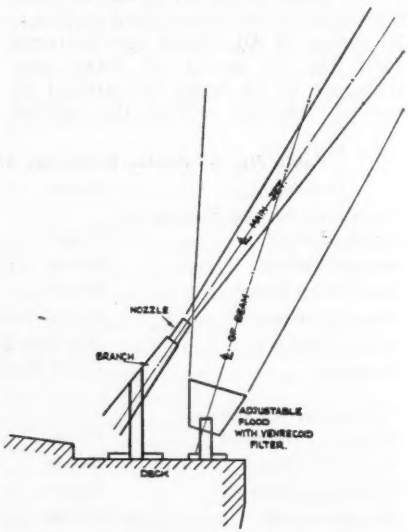



Fig. 10. Typical method of illuminating jet of water.

was agreed that the National Fire Service, which had contributed so largely towards the saving of life and property during the war, should share, with the Ministry of Works, the operation and maintenance of the aquatic equipment.

To produce the designed effect it was decided to build up the apparatus on eight fire boats and twenty-two wooden barges. These could be anchored in certain positions (as determined by a consideration of the final picture and by the regulations affecting the river traffic) and contained generally within the pool between Lambeth and Westminster Bridges.

The fire boats, which could in no way be represented in the morning parade, were to hold the position of honour at midstream, and by manning them with skilled N.F.S. personnel their powerful monitors were to be used to produce well defined fleurs-de-lys up to one hundred feet in height. To increase the effect, side jets were also to be provided. Yet at the same time these special arrangements could in no way allow the official duties of the craft to be over-ridden and they were to be prepared for normal duty if called upon.

The wooden barges, anchored on each side of the stream, were to be used to provide a coloured background. Through a system of spargefaction each barge was to become a luminescent carpet on the surface of the water from which were to emerge the fleurs-de-lys.

Because the action of coloured light upon the different stages of aquatic spargefaction can produce so many beautiful effects much experimental work was necessary, that the type of discharge required to create the suggested illusion might be evolved. The spectroscopic action of white light under these conditions increased considerably the possibilities of any scheme.

In its final form it was arranged

**Table No. 6—Details of River Display**

PUMPING APPARATUS, ETC.

1. *For each of* 22 *Barges* :—
   - 3,500-gallon pumps (Ex Defence Services)
   - 48 Side Jets (incl. 15 Sparges)
   - 9 Fleur de Lys
   - Water supplied to nozzles at 35/50 lb. per sq. in.
2. *For each of* 8 *Fire Boats* :—
   - 3 Fleur de Lys
   - 10 Side Jets (supplementary)

LIGHTING APPARATUS

1. *For each of* 22 *Barges* :—
   - 30 Watertight Floods (200 w.) Ex Admiralty
   - 9 Watertight Floods (500 w.) Focusing Type B.1 Lamp
   - 1 R.A.F. Landing Flood (3 kW.) Line Filament
   - 1 Standby Generator
2. *For each of* 8 *Fire Boats* :—
   - 5 Watertight Floods (500 w.) Focusing Type A.1 Lamp
   - 8 Spot Lights (as used on tanks) (48 w., 12 v.) supplied from starter batteries
   - 1 3½-kW. Generator Set (Ex Army)
3. *Other Lighting* :—
   - 80 Watertight Floods (200 w.) Ex Admiralty Lambeth Bridge Arches
   - 144 Watertight Floods Westminster Bridge Arches

*For each of* 22 *Barges* :—
- 1 Set of Switch and Control Gear
- 1 Ex-Service Telephone
- 1 Ex-Service R/T set.

*For Central Tower* :—
- 1 Telephone Board
- 1 R/T Set
- 1 Set of Signalling Lights (White, Green and Red)

*Miscellaneous* :—
- Mooring Cables
- Telephone Cables, Supply Cables } Submarine

In addition to the River Display as discussed, arrangements were made for the barges to be moored at various points on the river during the following week. They were to operate as isolated displays and as they had been designed as self-contained units including generator, no external supplies became necessary. Volunteers from various official departments formed the necessary crews.

that each barge should have its own particular colour combination, both for the sparge jets, and for the fleurs-de-lys. Some would appear predominantly red, some blue, and some yellow, whilst others would be mixed to break up the sequence.

In addition to the lighting fittings associated with the jets it also became apparent that some form of illumination would be required for the stream of foam that was to be released by the N.F.S. when the tide was on the ebb. To meet this need a landing flood (R.A.F. pattern) was to be mounted on the control tower of each barge. The illumination thus obtained would also be supplemented by other forms as provided by the firework display.

Other aquatic features, such as illuminated bridge cascades, were also to be included; and once again experimental work was the means of producing the best results. Full details are given in table No. 6.

SEARCHLIGHT DISPLAY.—The searchlights were to form an integral part of the river display, especially at the outset, when upon the word of command they were to dip in salute to H.M. the King. They were also to be employed to "pick up" the special aircraft that were to pass over the scene. Apart, however, from their primary task, the searchlights were to flash the sky with ever-changing colours throughout the entire programme.

FIREWORK DISPLAY.—The choice of "fire" as an element of decoration initiated the greatest display of fireworks this country has ever witnessed. Broad in conception, magnificent in colour, and wide in appeal, the entire constellation was designed to illuminate the sky and all that lay beneath its canopy within the precincts of Westminster.

The official programme gives full details as to the nature of the display, but it may be interesting to note that for the purpose of "flashing" the entire city simultaneously a specially designed firework was to form the climax of the evening.

Many aquatic fireworks were also to be employed, and in addition to creating still more lovely effects they were to be instrumental in providing supplementary lighting for the foam display.

GENERAL.—Figure No. 11 which gives full details as to the co-ordination of the various displays to achieve the river display itself, shows that as the climax was reached everything was to go into action.

Briefly enumerated certain practical aspects of the river display may be

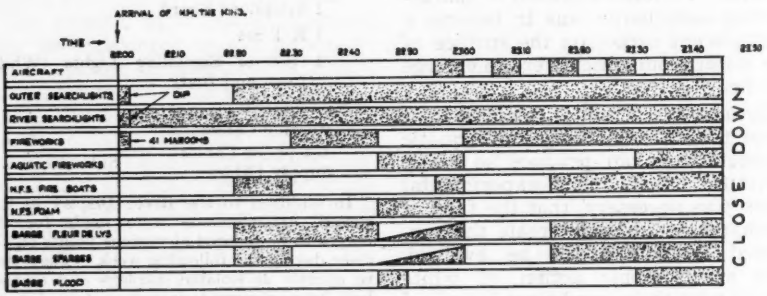



**Fig. 11. Diagrammatic arrangement of the river display programme. Traditional music (including Handel's Water, and Firework Music) was provided by the B.B.C. over landlines and P.A. equipment.**

of interest, for they serve to indicate the nature of the problem as a whole.

1. Being tidal, the Thames provided great anxiety with regard to mooring, cabling, timing, and organisation generally.
2. Rehearsals were not possible for the same reason.
3. River navigation must continue until the commencement of the programme.
4. Elaborate methods of communication were essential. They included telephones, R.T. sets, and coloured signals.
5. Since all equipment was of disused war service pattern it required constant attention.
6. Street lighting in the vicinity required to be under control.

### Nature and Extent of Equipment

Tables Nos. 1-6 provide much information on this point. Generally speaking, however, the equipment may be said to include not only the lamps and special fittings, but supply units, time switches, dimmers, transformers, colour screens, filters, batteries, handlamps, and thousands of yards of disused cable. For aquatic displays the equipment also included pumps, pipework, hose, hose gear, and protective clothing, all of which required to be adapted to the needs of the day.

### The Absence of Animated Displays

At the present time night advertising signs are prohibited, and it may be interesting to remark upon the purely artistic appeal of the public lighting. This was due not only to the unified treatment throughout but to the complete freedom from diverting effects.

### Final Results and Opinions

It may be recalled that public floodlighting commenced in a very small way not many years ago. One or two industrial and commercial houses, realising the advertising value, gradually adopted the system. Later, civic authorities were impressed, and called upon the services of the illumination engineer with a view to displaying their more important buildings. Finally the matter came to be regarded upon a much higher scale, and the recent demonstrations, under unified control, achieved an effect as lavish in colour as the decoration was extensive in range.

Public opinion, however, cannot be regarded as a sure criterion of the excellence in design and effect. Nevertheless, in national matters, both the engineer and architect must be ready to listen; and rather than work in opposition to public demands, they must gradually earn the confidence of the layman and lead him through the controversial channels of technique and aesthetics.

The results of the recent lighting displays must be judged in relation to their effect upon the official programme. Moreover, to arrive at reliable conclusions, it may be useful to remark upon the various aspects that contribute towards the success or otherwise of any decorative scheme; for if every reader who had witnessed the Victory programme were to base his appraisal upon the merits and demerits of applied lighting in architecture and decoration, much profitable discussion might ensue.

To conclude, it may be recalled that the British citizen is not unresponsive in matters affecting civic beauty, and given the lead he will surely support the endeavours of the illumination engineer to "Give Us Light."

### Final Appreciation

It is gratifying to learn that all ranks of London's great community have acclaimed the successful rendering of an unforgettable Victory Day.

Buckingham Palace itself has registered unsolicited testimony; and Their Majesties the King and Queen, to-

gether with Queen Mary, have graciously expressed their appreciation of this unparalleled demonstration of grace, charm, and beauty.

**Acknowledgements**

The public lighting arrangements were under the direction of Mr. J. Wilson. Those for the river display were directed by Mr. N. Sizer, M.B.E., M.C., M.I.Mech.E., M.I.E.E. Both engineers are on the senior staff of the Ministry of Works.

# Colour and its Measurement

In a paper on the above subject read before I.E.S. Liverpool Centre on May 7 Mr. W. Harrison reviewed the problems of colorimetry.

Although highly scientific methods of colour identification have been devised the process of specifying the colour of materials by sample is not to be despised. Expert colourists can detect quite minute differences in shades of colour. Mr. Harrison demonstrated, however, by means of a display of colour fabrics, how greatly the appearance of a coloured object may be altered by the spectral composition of the illuminant.

After discussing colorimetry, colour sensation, colour mixtures, the C.I.E. system, and the representation on colour-diagrams of modern illuminants, Mr. Harrison described a simple form of instrument to measure the tri-chromatic co-efficients of fluorescent lamps. This instrument utilises a box divided into two compartments and having a window of flashed opal glass. Three fluorescent tubes in one compartment provide the matching stimuli. The amount of light reaching the window from a tube is regulated by two paxolin sleeves, and the amounts of the matching stimuli are measured by placing a rectifier photocell against the window.

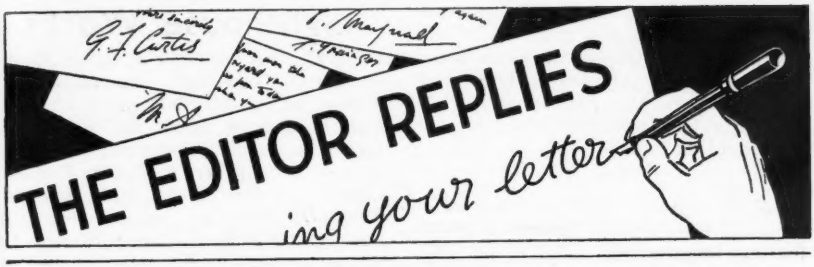
The lecturer pointed out the advantages of the apparatus, e.g., that the matching stimuli may be chosen to suit the test stimulus and the simplicity with which transformations to X Y Z trichromatic co-efficients may be made.

The main requirement in an illuminant to serve as a satisfactory substitute for daylight is spectral composition approaching that of black body radiation, at a suitable colour temperature. Other requirements are reproduceability, easy maintenance, and high efficiency. Research with the colorimeter suggests that these conditions are approached in a combination of a magnesium tungstate fluorescent lamp with filament lamps. Thus 600 watts of filament lamps and two 80-watt fluorescent tubes give a colour temperature in the vicinity of 4700 deg. K. and furnish an illumination of 150 foot-candles at a distance of 3½ ft. from the source. Such a combination is very suitable for the illumination of a table devoted to the comparison of samples and patterns.

# Fluorescent Lighting and Health

Occasionally stories are heard about deleterious effects of fluorescent lighting. Some months ago we referred to a paper on this subject read before the American I.E.S. The conclusion was then drawn that although eye-trouble due to misuse of the lamps may sometimes be reported, such cases are few. There is no evidence of anything intrinsically wrong with this system of lighting.

This is substantially the view expressed by Mr. H. C. Weston in his recent Presidential Address and is again endorsed in the analysis, ending with the words ". . . no valid evidence of harmful effects is known," in the "Questions and Answers" section of the *British Medical Journal*. It is highly probable that where eye-strain, headache or other ill-effect is reported this is due to lack of care in the use of the lamps and, in particular, to failure to appreciate that even a source of mild brilliance, such as this, should not be used unscreened in close proximity to the eyes.




Those interested in this question may be referred to the report of a Committee of the American I.E.S. on **Visibility Levels** ("Illuminating Engineering," May, 1946, p. 351.). This contains tables of the visibility level attained respectively with 10 and 20 foot-candles for various sizes of type. It also contains statements of values of illumination for equal visibility, set in the appropriate type to which the statement refers. Thus 8-point type must be illuminated to 50 foot-candles to attain the visibility of 12-point type under 20 ft.-candles.

Unless one regards all such work as illusory one must accept the dictum that diminution in size of reading matter brings with it a need for higher illuminations—as has, indeed been well illustrated by the researches of Weston in this country.

It will be observed, however, that the "standards of visibility" prescribed in this connection are specialised standards for the particular purposes. It may be necessary to devise something different for use in other fields, e.g., in street lighting, and it is difficult to conceive of any standard of visibility or even any definition of it which would suit all problems in illuminating engineering.

Mr. Axel Bagh, an I.E.S. member in Denmark, who recently drew my attention to the ideas of Mr. Poul Henningsen, a Danish architect, has gone to considerable trouble to prepare translations of some of his contributions for my benefit. So far as I can gather **Mr. Henningsen prefers the warmer colours,** and in general holds that less light of a yellow colour is needed than if white light, such as daylight, is used.

I think there are many who would concede that in certain circumstances (e.g., to a large extent in home lighting) **warm light is more agreeable.** I doubt, however, whether it enables people **to see better.** It must be remembered, too, that the spectra of most illuminants, certainly those of an incandescent variety, may actually differ a little, even when the apparent colour seems to vary within wide limits.

I believe Sir William Abney once showed that the apparent "whiteness" of the arc was due to the presence of an element in the blue end of the spectrum that actually accounted for less than half of one per cent of the total energy. By introducing a yellow screen, therefore, one could create the apparent warm colour without any material loss in efficiency.

This consideration seems to dispose of another idea, apparently held by Mr. Henningsen, that the newer and whiter illuminants do not contain sufficient warm light for his purpose. On the contrary these illuminants are in general so **much more efficient** that it would pay to use them—even if by means of screens, etc., one sacrifices part of the light to obtain **a warm and mellow hue.**

I have been asked, **"What is the earliest lamp known?"** This is a question for an antiquarian rather than an illuminating engineer. I notice, how-

ever, that as a frontispiece to "A Symposium of Illumination" gold and silver lamps of Queen Shub-Ad, dated 3500 B.C. are illustrated. This is a respectable antiquity, though no doubt more primitive lamps going back further still could be cited.

Letters continue to arrive inquiring in regard to **Resettlement Courses in Illuminating Engineering** and the prospect of jobs in the lighting industry. The two things are closely related as will be seen from the note which appears elsewhere in this issue (p. 115). It is obviously to the advantage of firms in the lighting industry to encourage applicants with some previous training in the theoretical side of illuminating engineering, and manifestly most important to organisers of such courses that this should be recognised. Once it is understood that courses furnish **a gateway to employment** there should be no difficulty in ensuring a good attendance.

I have been asked **how far fluorescent lighting is adapted to churches,** and where examples of such installations are to be seen. I must confess that the standard 5 ft. lamp, as usually installed in offices and factories, does not appeal very much in this connection. The use of longer tubing of the high voltage pattern seems preferable, as it can be adapted to contours, though I am not sure that, even in this case, one would wish the luminous tubing to be visible. Concealed lighting., e.g., for the lighting of choir and altar, seems more likely to be successful. I must confess, however, that I have few data in regard to installations of this nature. Can any readers furnish good examples?

One still occasionally hears the view expressed that a small type does not require a higher illumination than a large one for equal ease in reading. I have even heard the declaration (which could surely only have been made by someone with super-normal vision) that small type and large type are equally easy to read!

# Lighthouse Works

Lights of 10,000,000 c.p., as an aid to navigation, are not unusual to-day, visible at about 30 miles distant. Messrs. Chance Bros. and Co., who specialise in lighthouse equipment have orders in hand from China, Finland, Greece, Iceland, India, New Zealand, Norway, and other countries—besides the requirements of Trinity House. Of special interest is an order, valued at about £88,000, from the Yugoslav Government, for equipment to be used on the Dalmatian coast. Acetylene and petroleum vapour installations, revolving lights, flashers, solar dial time switches, etc., are included.


## SITUATIONS VACANT

**LEADING manufacturers of decorative lighting fittings for fluorescent lamps have vacancies for LIGHTING ENGINEER, aged 20 to 30, with technical and sales ability, and also for WORKS DRAUGHTSMAN for fittings detail design. Good salary and prospects.—Apply, giving age, experience and present salary to Box No. 572, "Light and Lighting," 32, Victoria-street, London, S.W.1.**


# BT-H Jubilee

It is of interest to note that one of the leading firms in the lighting industry, the British Thomson-Houston Co., Ltd., recently celebrated its fiftieth anniversary. The company was formed on May 18, 1896, though the Thomson-Houston partnership began in America some 16 years earlier. Much early pioneering work was done by the BTH—for instance, in connection with original "Twopenny Tube" (Central London Railway). Manufacturing began at the Rugby works in 1902. To our readers its work in the lighting field commands chief interest, and with this two well-known I.E.S. members, Mr. L. J. Davies (director of research) and Dr. H. Warren (now managing director), are closely identified.

# Photometry and Colorimetry of Fluorescent and other Electric Discharge Lamps

by G. T. WINCH

*(Trans. Illum. Eng. Soc. (Lond.), June, 1946)*

Although, as previously announced, it has been found possible to resume distribution of *Light and Lighting* and ordinary issues of the I.E.S. Transactions to *all* members, the Paper Restrictions do not render it possible to deal in this way with papers of exceptional length.

Accordingly, it has been decided to limit the distribution of the **June (1946) issue** of the Transactions, containing the **paper by Mr. G. T. Winch,** which will be sent to libraries and to such bodies as require the Transactions for permanent reference, but only to those I.E.S. members who make application for it (which all members who are in the habit of retaining copies and binding them in volume form will naturally do).

Members who wish to receive the June issue of the I.E.S. Transactions, which will be available very shortly, are accordingly requested to fill up and return to the Hon. Secretary the attached form.

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*This form to be returned to the Hon. Secretary of the Illuminating Engineering Society, 32, Victoria Street, London, S.W.1.*

## I.E.S. Transactions, June, 1946

Please send me the issue of the Transactions for June, 1946, containing the paper entitled "Photometry and Colorimetry of Fluorescent and other Electric Discharge Lamps," by G. T. Winch.

Signature of Member.....

.....

Name and Address to which copies should be sent.

In clear block letters.

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## Lighting Reconstruction Pamphlets

Readers are reminded that copies of the series of Lighting Reconstruction Pamphlets are still available on application to the Illuminating Engineering Society (32, Victoria-street, London, S.W.1).

It will be recalled that the first five of the series are all available at the same rate (single copies 1s. each, 9s. per dozen, £3 per 100). The titles are as follows: No. 1, "The Principles of Good Lighting"; No. 2, "The Lighting of Public Buildings"; No. 3, "The Lighting of Schools"; No. 4, "Natural Lighting"; No. 5, "Public Lighting in the City and Highway."

The sixth of the series, "Making Work Lighter," which carries illustrations by Fougasse, is issued at the special flat rate of 6d. a copy.

## I.E.S. Convention

### Special Souvenir Programmes

Apart from the general introductory programme of the Convention, circulated prior to the gathering, all members attending were presented on arrival with a special **Illustrated Souvenir Programme,** containing particulars of the chief events and containing pictures and biographical notes in regard to the leading I.E.S. members and distinguished visitors taking part.

Many of those who were unable to attend the Convention will doubtless wish to have copies of this Souvenir Programme. A supply of these has been furnished to secretaries of Centres and Groups throughout the country, from whom copies are obtainable; or on application to 32, Victoria-street, London, S.W.1.

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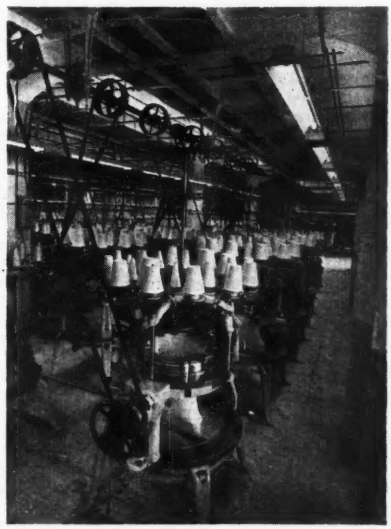
# Light and Colour in Industry

We recently referred* to the exhibition in Leicester, organised by the Electric Lamp Manufacturers Association in connection with the Hosiery Working Party, in which the use of fluorescent lighting for knitting and linking machines was demonstrated. A feature was the use of colour to furnish an agreeable background to the work, various combinations and colour schemes being shown. The attached illustration, which has since reached us, shows a typical view of an interior. It will be recalled that the exhibition extended over May 22 to June 7.



*"Light and Lighting," May, 1946, p. x.

# The Application of the I.E.S. Code to Cotton Spinning and Weaving

By N. C. HODSON

**Summary of a paper read before the I.E.S. Manchester Centre on February 28, 1946**

In introducing his paper on this subject, Mr. Hodson said that there was probably no other industry of similar national importance where the necessity for good lighting conditions had been so little recognised—even though all concerned now agreed that steps must be taken to conform with the requirements of the "Fifth Departmental Committee Report on Factory Lighting," which had approved the standards of the I.E.S. Code.

In many cases, however, increased illumination would involve additional power consumption which, for those mills which generate their own power, might mean the installation of extra plant, for in many cases the existing plant would be unable to accept the additional load.

On the choice of lighting equipment Mr. Hodson first gave comparative figures for tungsten filament and fluorescent lighting. The selection of the type of lighting was necessarily based largely on economic grounds. The number of burning hours was therefore of importance, and in this respect the diagram on page 6 of the I.E.S. Code was of great assistance.

Dealing with some of the particular problems found in the trade Mr. Hodson said that the dimensions of card rooms usually allowed the use of high-mounting heights. A standard dispersive type of fitting with a lumen output of 3,600 lumens was very suitable, giving a much-needed atmosphere of general brightness. Such units can be mounted at not too frequent intervals without causing dangerous shadows between the cards and they can also be used to cover the draw frames usually found beyond the carding engines.

The question of providing suitable illumination for drawing in frames should not be overlooked. In general practice the "drawer" is usually provided with a movable light, but there may be no attempt to reduce the brightness of this light so as to reduce the serious glare which is experienced by the eyes of the person working behind the frame. A high value of illumination is not demanded for this process if light colours of yarn are being used, but it is necessary for an equal degree of illumination to be provided on both sides of the frame and for care to be taken to screen the brightness of any local light sources.

In the lighting of mules in spinning rooms, Mr. Hodson remarked, there was a possibility of devising a standard scheme which would produce the even illumination which is required over the whole area between the creels and pairs of mules. The system which appeared to be most satisfactory was a double row of dispersive-type lighting units, each of 1,500 lumen output, mounted high up along each mule gate and 18 inches in front of the roller beam. No advantage had been found by varying the size of the lighting unit or by altering the spacing. The lighting of ring frames presents a more difficult task as many factors involving the layout of the machinery had to be considered. New layouts are under review, and until these are settled only continuous rows of fluorescent lamps could be recommended.

Mr. Hodson then dealt with the application of the I.E.S. Artificial Lighting Chart (page 15 of the Code) in connection with weaving, pointing out the difficulties encountered when viewing dark colours which, in his opinion, called for an illumination up to 100 lumens per square foot rather than the figure of 30 given in the Code. A number of firms had, in fact, found higher illuminations indispensable. Further, even though values as given in the Code were accepted it was not easy to get these values on to the working plane. The author showed a number of slides illustrating the various types of looms in use, and pointed out the lighting problems particular to each. Although fluorescent lighting was often found to give satisfaction there were sometimes practical difficulties in its use, particularly in the case of Jacquard looms.

The author, in concluding his paper, remarked that at present the cost of fluorescent lighting was likely to limit its application in the cotton trade. A much wider knowledge of the operating characteristics of tungsten filament lamps was therefore desirable.

In outlining the practical application of the lighting code to the industry he stressed that it was impossible to publish a concrete blueprint to meet the varying needs of individual cases. A careful survey of all the conditions relating to each lighting problem must be made.